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# A TECHNIQUE FOR REARING CERTAIN HEMIPTERA

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Scientists interested in biology are always eager to utilize new kinds of laboratory animals in their research. The behavior of different animals under different conditions has been a fruitful source of new knowledge of biological processes. Hemiptera, including the true bugs, leafhoppers, and aphids, have already contributed much to our knowledge of insect physiology and cytogenetics. The development of a simple method of rearing a number of species under conditions suitable for comparative studies should greatly enhance the usefulness of these insects as tools for biological research.

Before any organism can be used successfully in the laboratory, a dependable and uniform food supply must be available. Furthermore, the method of housing should be efficient and suited to the handling of large numbers of individuals. Workers who have studied plant-feeding Hemiptera have, almost without exception, complained of problems involving food supply, humidity, and sanitation

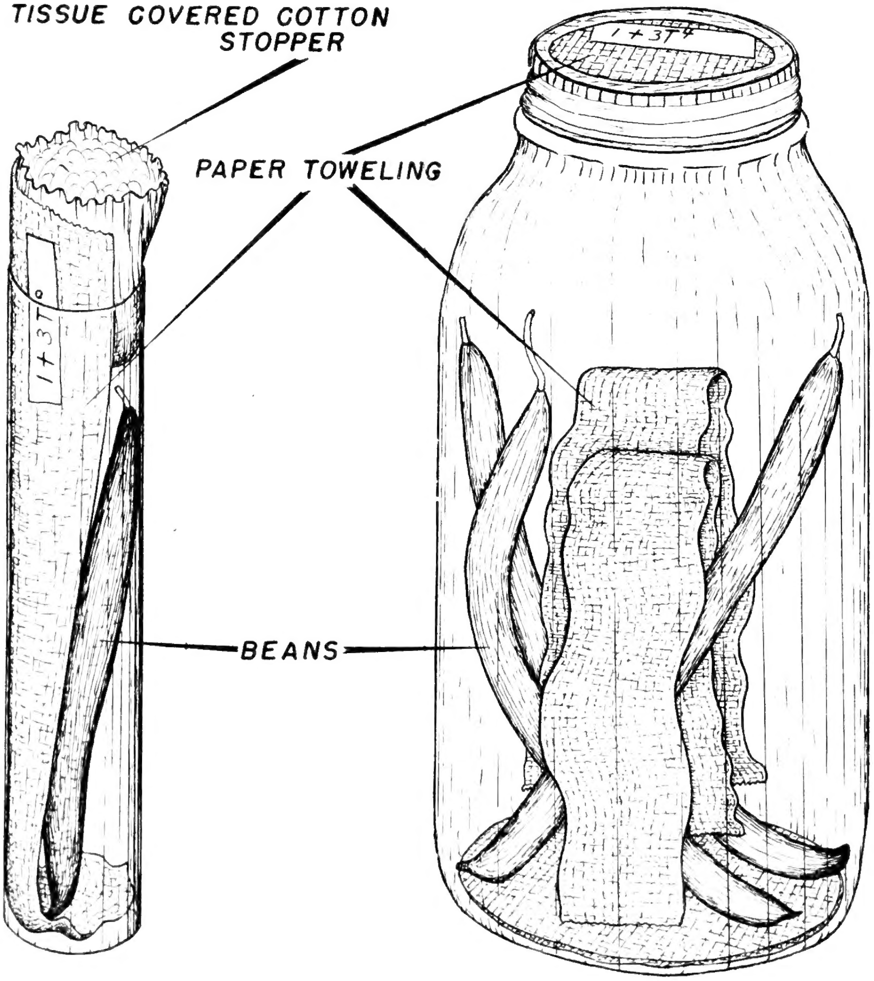
Esselbaugh (1949), in his extensive paper on the bionomics of middle-western Pentatomidae, noted the need to renew daily such food materials as "bits of lettuce, corn, tomato or green bean--while whole fruits lasted somewhat longer." He found it necessary to add moisture to his containers twice daily. Foot and Strobell (1914), in a paper reporting crossing experiments with *Euschistus servus* (Say) and *variolarius* (P. de B.), commented that 2 years' experience was required before they mastered the technique for rearing their stock. By using timothy heads and blackberry fruits for food and housing their specimens in shallow glass jars covered by fine screening, they were able to rear a large number with comparatively low mortality. However, it is apparent that each specimen received individual care and was checked several times during each 24-hour period.

In the last 2 years I have succeeded in rearing several species of Pentatomidae through several generations, and in addition several other species belonging to other families from field-collected nymphs. With

the technique that I used I was able to maintain colonies of several species comprising a total of as many as 800 individuals with low mortality and a minimum of effort.

## Technique

My method differs from those described by other workers principally in the use of green snap beans for food and of fruit jars for rearing cages. To conserve space, isolated pairs of insects are kept in glass tubes 5 1/2 inches by 1 inch. Each tube is stoppered by a cotton plug enclosed in absorbent tissue. Jars and tubes are set up as shown below. Rims of Mason lids, screwed down on circular pieces of paper toweling, serve to close the jars. A tube will house one pair of stink bugs or a clutch (product of one egg mass) of nymphs through the second instar. A jar will house 10 pairs of adults or as many as 60 fifth instars.



Left, glass tube used to house isolated females or pairs of stink bugs. Right, fruit jar used to rear nymphs or to house breeding stock.

The care required to keep the food fresh and the jars in sanitary condition varies with the number and age of the specimens. There is always enough moisture in the jars, and at times an excess originating from the beans and from the excretions of the insects. When the humidity is high, moisture accumulates and the jars require more frequent attention.

With relative humidity less than 50 percent and a temperature of about 75° F. jars and tubes seldom require attention more than twice a week. An unknown disease sometimes affects both nymphs and adults, causing their body contents to liquefy and have a foul odor. To avoid mortality from this disease it is necessary to wash and scald the jars with each change of food.

If the beans are allowed to become too dry, nymphs of Euschistus, Thyanta, and Acrosternum will turn to cannibalism. The victims are generally attacked during molting. However, apparently active, normal nymphs are sometimes killed. This habit is likely to continue even after optimum food conditions are restored.

The use of green snap beans as food has many advantages. The beans are available throughout the year at most large grocery stores. The cost is not excessive, since a pound will ordinarily maintain 200 adults for a week. Finally, they seem to be the nearest approach to a generally acceptable food for Hemiptera that has yet been tested. No doubt certain species find the diet more to their liking than others. Certainly some cannot reproduce, and still others fail to survive as adult individuals when restricted to feeding only on green snap beans.

My experience with Euschistus tristigmus (Say) strongly suggests that inability to maintain successive generations in laboratory colonies of certain Hemiptera may have been the result of inbreeding. Past workers have generally attributed this difficulty to diet. It was my observation that the first generation produced from field-collected females tristigmus thrived, but that the second and third generations were maintained with difficulty. In these generations a high percentage of eggs were sterile and mortality among nymphs was unusually high. The situation improved in the fourth generation. Eggs laid by the fifth generation were nearly 100 percent fertile and mortality among nymphs has been unusually low. Except for seasonal change in length of day, laboratory conditions were identical for all generations.

It seems likely that the changes in fertility and mortality may be attributed to rigorous selection whereby lethal and deleterious recessive characters were eliminated. The fact that the first laboratory generation originated from three females emphasizes the extent to which inbreeding has taken place during the five subsequent generations.

The data so far obtained relative to rearing Hemiptera by the technique described above are summarized in table 1.

Table 1. --Results of attempts to rear various species of Hemiptera on green snap beans in fruit jars.

| Species | Reared | | | Field-collected adults | | Eggs hatched but nymphs died at end of first instar | Evidence of rearing egg to egg inconclusive | Cannot be reared on snap beans |
|---|---|---|---|---|---|---|---|---|
| | Egg to egg (number of generations) | Adult to adult | Nymph to adult | Lived 1 month or more | Failed to survive 1 month | | | |
| Pentatomidae: | | | | | | | | |
| Acrosternum hilare (Say) | 2 | | | | | | | |
| Brochymena quadripustulata (F.) | | | | + | | | | |
| Corimelaena lateralis (F.) | | | | + | | | + | |
| Cosmopepla bimaculata (Thom.) | 2 | | | | | | | |
| Euschistus politus Uhler | | | | + | | | | |
| Euschistus servus (Say) | 4 | | | | | | | |
| Euschistus tristigmus (Say) | 6 | | | | | | | |
| Euschistus variolarius (P. deB.) | 4 | | | | | | | |
| Galgupha ovalis Hussey | - | | + | + | | | + | |
| Homaemus aeneifrons (Say) | - | | | + | | + | | |
| Hymenarcys nervosa (Say) | - | + | | | | | + | |
| Mormidea lugens (F.) | - | | | | + | | | + |
| Peribalus limbolarius Stål | - | | + | + | | | + | |
| Thyanta custator (F.) | 4 | | | | | | | |
| Trichopepla semivittata (Say) | - | | | + | | | | + |
| Coreidae: | | | | | | | | |
| Alydus eurinus (Say) | - | | + | + | | + | + | |
| Alydus pilosulus H.-S | - | | + | + | | + | + | |
| Archimerus alternatus (Say) | - | | + | + | | | + | |
| Euthochtha galeator (F.) | - | | + | + | | | + | |
| Miridae: | | | | | | | | |
| Adelphocoris rapidus (Say) | - | | + | + | | | + | |
| Lygus oblineatus (Say) | - | | + | + | | | + | |
| Polymerus basalis (Reut.) | - | | | + | | | + | |
| Cicadellidae: | | | | | | | | |
| Empoasca fabae (Harr.) | 1 | | | | | | | |

## Literature Cited

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Foot, K., and Strobell, E. C.
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